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AUTHOR Billingham, Katherine A.; And Others
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ABSTRACT

Research has recognized that anxiety may exert a debilitating effect on students' academic performance; however, many studies of test anxiety have been limited by their failure to consider sex differences. Two studies were conducted to analyze sex differences of the Test Anxiety Scale (TAS) and achievement correlates and to validate a factor analytic study of the TAS. In the first study, TAS scores plus Richardson Factors I and II from 694 freshmen were correlated with high school rank, ACT (American College Test) scores, and grade point average. In the second study, 42 subjects completed the TAS and several achievement attitude measures and anxiety measures. In both studies, females had higher scores than males on TAS and Richardson Factors I and II. For females, test anxiety was related to achievement measures and attitudes. The findings confirm the importance of sex differences in test anxiety. (Author/JAC)

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Influences of Sex Differences and Achievement on Test Anxiety

Katherine A. Billingham, Ph.D.
Department of Psychology and Social Sciences
Rush-Presbyterian-St. Lukes Medical Center
Chicago, Illinois

and

Shiela C. Ribordy, Ph.D., Betty Burrows, M.A.,
Mark A. Mollica, M.A.
Department of Psychology
DePaul University
Chicago, Illinois

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Influences of Sex Differences and Achievement on Test Anxiety

Introduction

It has long been recognized that anxiety may exert a debilitating effect on college students' academic performance (Alpert & Haber, 1960; Brown, 1938a, 1938b; Jacobson, 1938; McKeachie, 1951; Spielberger, 1962). In the last several years there has been little theoretical agreement, however, over what types of anxiety actually interfere with academic performance. A number of theorists (Doctor & Altman, 1969; Liebert & Morris, 1967; Sarason, 1971; Spielberger, Anton & Bidell, 1976) have argued that test anxiety is not a unitary disorder, but rather composed of several components. Among those components suggested have been: "lack of strong achievement strivings" (Richardson, O'Neil, Whitmore & Judd, 1977); attitudes towards success (Phares, 1968); study habits (Allen, 1971; Culter & Holahan, 1980; Desederato & Koskinen, 1969; Mitchell & Ng, 1972); and internal versus external blame for failure (Doris & Sarason, 1955). These components of test anxiety have been predominantly investigated in outcome studies which have attempted to compare the relative effectiveness of various treatments in alleviating academic anxiety and improving academic performance (Allen, 1972; Billingham & Ribordy, note 1; Ribordy & Billingham, note 2). However, the overall pattern of results of these studies has been equivocal (Allen, 1972; Finger & Galassi, 1977; Billingham & Ribordy, note 1). Two factors which have possibly contributed to this lack of clear understanding of the components of test anxiety and the mixed results of outcome studies are: psychometric issues with the Test Anxiety Scale (TAS) (I. Sarason, 1958) and the influences of sex differences.

The TAS originally consisted of 21 items taken from the Test Anxiety Questionnaire (TAQ) (Mandler & S. Sarason, 1952) rewritten in a true-false format. At a later point, items were added to increase the sensitivity and reliability of the TAS (I. Sarason, 1972) resulting in the latest 37-item version. This test is the most widely used measure for screening for test anxiety and evaluating outcome (Spielberger, et. al., 1976). However, as stated by Spielberger, et. al. (1976),

"Since the TAQ and the TAS, including its earlier versions, have been widely used in research in test anxiety, the lack of information regarding the psychometric properties of these scales remains a serious limitation in test anxiety research" (p. 325). It is further stated that " the TAS still lacks norms and a systematic presentation of its correlates (Spielberger, et. al., 1976, p. 325)." Although some progress has been made since these statements were made, psychometric issues with the TAS still remain - specifically those relating to norms and sex differences. I. Sarason (1978) presented norms for the TAS for 283 males and 237 females, but replication with larger samples is needed. In addition, the systematic evaluations of components of test anxiety have been limited by disregard for sex difference influences. Specifically, Richardson, et. al. (1977) factored the TAS and reported the results of a two-factor solution. They reported that Factor 1 measured "pure" test anxiety. Their second factor, reportedly independent of the first, was seen as involving "a sense of alienation and threat...a student who is not competitive and lacks strong achievement strivings" (Richardson, et. al., 1977). It should be noted, however, that females consistently score higher than males on measures of test anxiety (Hill & S. Sarason, 1966; Manley & Rosemier, 1972; Taylor, 1977). Consequently, an important limitation in the Richardson study, as in all previous factor studies of test anxiety, is that data for males and females were included in the same factor analysis. Furthermore, studies examining the correlates and treatment of test anxiety have been inconsistent in recognizing the influence of sex differences. Several test anxiety studies have given no breakdown of sex of subject (i.e. Biglan, Villwock & Wicks, 1979; Culter & Holahan, 1980; Finger & Galassi, 1977; Mandler & Sarason, 1952; Mitchell & Ng, 1972; Morris & Liebert, 1969, 1970; Snyder & Deffenbacher, 1977). Some studies have reported the number of males and females in the sample, but did not analyze data separately by sex (i.e. Aponte & Aponte, 1971; Goldfried, Linehan & Smith, 1978; Russell, Miller & June, 1974; Zenmore, 1975). And, finally, some

studies used only male subjects (i.e. Alpert & Haber, 1960; Morris & Liebert, 1973; Snider & Otting, 1966) or only female subjects (i.e. Green, 1977; Phares, 1968; Sarason, 1973, 1975; Thompson, Griebstein & Kuhlenschmidt, 1980).

In summary, in attempts to understand the components of test anxiety, the Richardson's study is limited in its failure to take into account sex differences and previous studies which have examined the correlates of test anxiety have been inconsistent in evaluating sex difference influences. Accordingly, the present two studies were designed to examine these issues by: (a) collecting norms for the TAS, computed separately by sex; (b) determining sex differences on scores of the TAS and Richardson's Factor I and Factor II; (c) examining the relationships of Factor I and Factor II to each other and achievement performance measures (computed separately for sex); and (d) evaluating the relationship of test anxiety to attitudes towards achievement, locus of control and study habits for each sex.

Methods and Results

Study I

Method: Six-hundred and ninety-four freshmen at DePaul University completed the TAS as part of a battery of entrance exams. Included in this sample were 311 females and 383 males. The TAS was scored for a Total score, a Factor I score, and a Factor II score (Richardson, et al, 1977). In addition, high school rank, ACT scores, cumulative hours, and grade point average (GPA) were collected. Cumulative hours and GPA were computed at the end of the freshman year of college.

Results: Table 1 contains the means, medians, and standard deviations for the entire sample and for each of the sexes separately. To determine whether sex differences existed on the test anxiety measures, t-tests were performed on each of the TAS scores. For the TAS Total score, there was homogeneity of variance ($F = 1.07$) and the t-test revealed a significant sex difference ($t(692) = 3.69$, $p < .0001$)

such that females reported more test anxiety ($\underline{M}$ = 16.47) then did males ($\underline{M}$ = 14.54). On the TAS Factor I score, the two sex groups showed homogeneity of variance ($\underline{F}$ = 1.07) while again sex differences were found to exisit ($\underline{t}(692) = 2.03$, $\underline{p} < .04$) such that females reported more test anxiety ($\underline{M}$ = 4.14) then males ($\underline{M}$ = 3.62). As variances were found to be significantly different for the TAS Factor II score ($\underline{F}$ = 1.25, $\underline{p} < .04$), the t-test was computed using separate variances. The result of that test showed significant sex differences ($\underline{t}(692) = 5.38$, $\underline{p} < .0001$), with females again reporting more test anxiety ($\underline{M}$ = 9.20) then did males ($\underline{M}$ = 7.93).

Pearson correlation coefficients were computed among the various TAS scores and the performance scores. Given the large sex differences that were found to exist for the three TAS scores, these correlations were computed separately for each of the sexes.

In terms of the primary performance measure, GPA, which could be considered a measure of actual achievement, only for females was test anxiety related to GPA. Then the relationship was such that those females earning higher GPA's, reported higher test anxiety. The relationships between test anxiety and cumulative hours were largely non-existent with the exception of the Factor II score for males. Those males earning more academic credit hours reported higher Factor II scores. There were very significant relationships found for both sexes between test anxiety and ACT scores. The relationships were inverse such that lower ACT scores were associated with higher test anxiety scores. The exception was the TAS Factor II score and ACT for females which did not reach significance. For high school rank, only female test anxiety scores were related, but unlike college GPA, higher test anxiety scores predicted lower class standing in high school (in this study, higher scores on high school rank signified lower class position). Contrary to Richardson et al's (1977) contention, Factor I and Factor II were found to be very positively related (+.88 for females, +.54 for males) and thus unlikely to be largely independent factors.

Study II

Method: Forty-two undergraduates from introductory psychology classes at DePaul University served as subjects in this study. The sample included 26 females and 16 males. Subjects were tested in a single session in which they were asked to complete the TAS, the Mehrabian Achieving Tendency Scale (MATS) (Mehrabian, 1969), the trait form of the State-Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch, & Lushene, 1970), the Success-Failure Inventory (SFI) (McReynolds & Guevara, 1967) the Locus of Control Scale (I-E) (Rotter, 1966), and the Survey of Study Habits and Attitudes (SSHA) (Brown & Holtzman, 1956). The TAS was scored for a Total score, a Factor I score and a Factor II score. The SFI yields both a motive to achieve success score and a motive to aviod failure score. Two scores were used from the SSHA, Study Habits (SH) and Study Attitudes (SA).

Results: Pearson correlation coefficients were computed between the three test anxiety scores and the other test scores. These compilations were done separately on each sex group. Table 3 contains a summary of these correlations. Primary findings were that in general test anxiety was not related to achievement for males but was so for females. With only one exception in six comparisons (TAS Factor II and MATS), female achievement was inversely and significantly related to test anxiety. Females with lower achievement motive scores and higher fear of failure scores reported more test anxiety.

For both sexes, test anxiety was positively related to general anxiety but not related to locus of control scores. As with the achievement scores, only females showed a relationship between test anxiety and study habits or study attitudes. These relationships were such that females who reported worse study habits and study attitudes also reported higher test anxiety. Finally, similarly to Study I, this study found very high positive correlations between TAS Factor I and TAS Factor II for both females (+.82) and males (+.78).

Discussion and Conclusions

Overall the present findings confirm the importance of sex differences in test anxiety. The report of more test anxiety among females than males on the TAS Total scores, the TAS Factor I scores and the TAS Factor II scores are consistent with previous findings (Taylor, 1977). Other significant sex differences in the present studies were that only for females a relationship existed for test anxiety and GPA, high school rank, lower achievement motive scores, high fear of failure and study habits or study attitudes. (Because of the last finding, study skills should be taken into account when treating females for test anxiety.) Only for males were the Factor II scores significantly related to cumulative hours. Consequently, future studies of correlates and treatment of test anxiety must include separate analysis for males and females.

Analysis of sex differences also resulted in a need for re-evaluation of Richardson's conception of test anxiety. Contrary to Richardson's findings (Richardson, et al, 1977) Factor I and Factor II were not found to be independent in both of the present studies. Secondly, it was found that Factor II scores related to GPA for males - thus countering Richardson's contention that Factor II individuals are not achievement oriented. In addition, Richardson claimed that Factor II could be conceptualized as a negative achievement attitude. However, in Study II, both Factor I and Factor II were related to attitudes of achievement motivation and fear of failure.

Finally, several seemingly contradictory findings suggest that test anxiety may be a complex concept, particulary for females. It was found, for example, that, in general, test anxiety was not related to achievement for males but was so for females. Interestingly, females with lower achievement motivation reported more test anxiety in Study II. However, in Study I, it was females with high test anxiety who had higher achievement performance (as measured by GPA). Although seemingly contradictory, these findings could suggest that some females may feel

uncomfortable self-reporting achievement desires. A second interesting finding was that high test anxious females had a lower class rank in high school, but had higher achievement in college (as measured by GPA). Such results could suggest that different achievement attitudes could be present in college than in high school, or that females develop a "facilitative" test anxiety when entering college, or that some females may only become test anxious after entering college where achievement may be encouraged in a different manner. Such complex findings suggest a rich area for future research on achievement attitudes and sex differences in test anxiety.

TABLE I

Population Norms for TAS Scores

	Mean	Median	SD
TAS Total			
Combined (N=694)	15.38	14.98	6.94
Females Only (N=311)	16.47	16.25	6.73
Males Only (N=383)	14.54	13.76	6.97
TAS Factor I			
Combined	3.85	3.04	3.40
Females Only	4.14	3.38	3.46
Males Only	3.62	2.75	3.34
TAS Factor II			
Combined	8.49	8.76	3.19
Females Only	9.20	9.47	2.92
Males Only	7.93	7.93	3.27

TABLE 2

Pearson Correlations Among TAS Scores and Performance Measures

		High School Rank	ACT	Cumulative Hours	GPA
TAS Total	(Females)	.11*	-.20****	.03	.09*
	(Males)	.06	-.25****	.08	-.03
TAS Factor I	(Females)	.14**	-.23****	.04	.06
	(Males)	.03	-.19****	.03	-.05
TAS Factor II	(Females)	.03	-.07	.04	.12*
	(Males)	.00	-.16****	.12*	.06

* $p < .05$
** $p < .01$
*** $p < .001$
**** $p < .0001$

TABLE 3

Correlation Coefficients Among Test Anxiety Scores
and Achievement Scores, General Anxiety,
Locus of Control, and Study Skills

			TAS Total	TAS Factor I	TAS Factor II
MATS	(Females)	(N=26)	-.54***	-.58***	-.56***
	(Males)	(N=16)	-.41	-.43*	-.37
Success (SFI)	(Females)		-.33*	-.36*	-.19
	(Males)		-.11	-.25	-.09
Failure (SFI)	(Females)		.66****	.68****	.57***
	(Males)		.32	.41	.30
STAI (trait)	(Females)		.59***	.65****	.50**
	(Males)		.53*	.47*	.64**
I-E	(Females)		.08	.02	.19
	(Males)		.29	.17	.35
SH (SSHA)	(Females)		-.38*	-.41*	-.32*
	(Males)		-.22	-.34	-.26
SA (SSHA)	(Females)		-.65	-.59***	-.67****
	(Males)		-.29	-.31	-.37

* $p < .05$
** $p < .01$
*** $p < .001$
**** $p < .0001$

NOTES

1. Billingham, K.A. & Ribordy, S. C. A review of test anxiety research: Methodological issues. Unpublished manuscript, 1981.

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